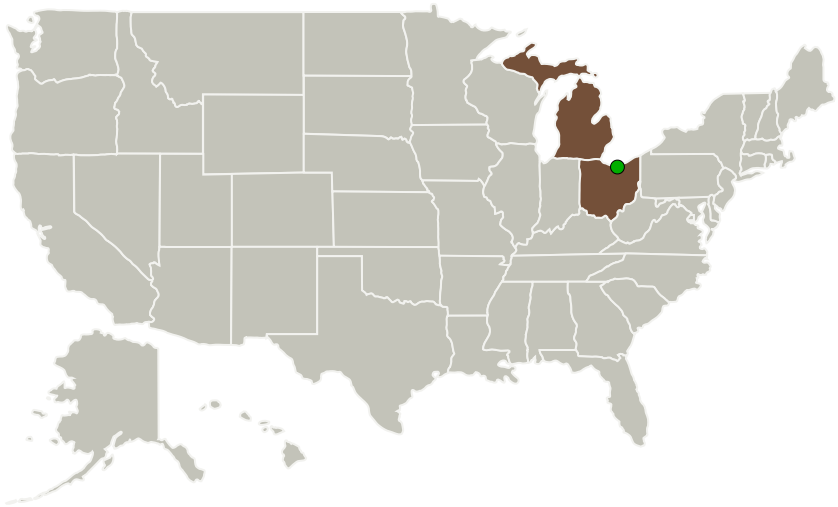
# High Power High Thrust Ion Thruster (HPHTion): 50 CM Ion Thruster for Near-Earth Applications, Phase II

Completed Technology Project (2011 - 2014)

## Project Introduction

Advances in high power, photovoltaic technology has enabled the possibility of reasonably sized, high specific power, high power, solar arrays. At high specific powers, power levels ranging from 50 to several hundred kW are feasible. Coupled with gridded ion thruster technology, this power technology can be mission enabling for a wide range of missions ranging from ambitious near Earth NASA missions to those missions involving other customers as well such as DOD and commercial satellite interests. Indeed the HEFT clearly identified the need for high power electric. The appeal of the ion thrusters for such applications stems from their overall high efficiency, typically >70% and long life. In response to the need for a single, high powered engine to fill the gulf between the 7 kW NEXT system and a notional 25 kW engine, a Phase I activity to build a 25 kW, 50 cm ion thruster discharge chamber was completed with a laboratory model fabricated. The proposed Phase II effort aims to mature the laboratory model into a proto-engineering model ion thruster. The proposed effort involves the evolution of the discharge chamber to a high performance thruster by performance testing and characterization via simulated and full beam extraction testing. Through such testing the design will be optimized leading ultimately to the proposed design, build and preliminary checkout of a proto-engineering model thruster, thereby advancing the TRL level to 4-5 range. Deliverables include the thruster, a design package, and a performance data document.

## Primary U.S. Work Locations and Key Partners

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ElectroDynamic Applications, Inc. | Lead Organization | Industry Minority-Owned Business | Ann Arbor, Michigan |
| Glenn Research Center(GRC) | Supporting Organization | NASA Center | Cleveland, Ohio |
| University of Michigan-Ann Arbor | Supporting Organization | Academia | Ann Arbor, Michigan |

| Primary U.S. Work Locations | |
|---|---|
| Michigan | Ohio |

## Project Transitions

**July 2011:** Project Start

**February 2014:** Closed out

**Closeout Documentation:**

- Final Summary Chart*(https://techport.nasa.gov/file/138927)*

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

ElectroDynamic Applications, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

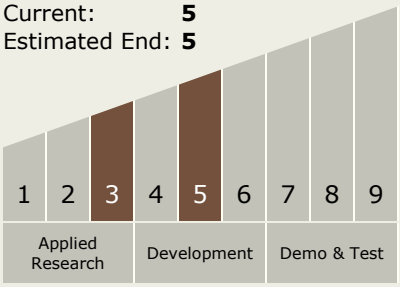
Carlos Torrez

**Principal Investigator:**

Christopher Davis

## Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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## Technology Areas

**Primary:**

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.3 Electromagnetic

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System